

## ABSTRACT OF THE DISCLOSURE

An optical fiber propagates and amplifies a second signal light that is a wavelength-multiplexed signal of a first signal light of a plurality of wavelengths and a reference light that is out of a wavelength range of amplification. An excitation light source outputs an excitation light for amplifying the second signal light. A beam splitter splits a portion of the second signal light into the first signal light and the reference light. A signal light level detecting unit detects a level of the first signal light. A reference light level detecting unit detects a level of the reference light. A signal level setting unit calculates a target value for constantly maintaining a Raman gain, and controls the output level of the excitation light in such a way that the first signal level matches with the target value.